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(54) Method and apparatus for printing indicia on pellet shaped pharmaceutical articles and orienting same within blistered packaging

(57) An apparatus for printing, orienting, and packaging a plurality of pellet shaped pharmaceutical articles 12 within blistered packaging material includes a feeding station 20 having a hopper 22 designed to contain and distribute a plurality of the articles. A printing station 36 has a printer which prints indicia on the face of the articles. A packaging station 42 has a conveyor system for continuously supplying packaging material containing blistered receptacles 48 each having a clear portion 50 that is capable of receiving and retaining an

article. A transporting device 24 having a drum 26 with a plurality of peripherally spaced cavities 28 adapted to receive the articles 12 from the feeding station 20 that carries the articles past the printing station 36 and deposits them at the packaging station 42. A sealing station 52 applies a seal to the packaging material and a cutting station 56 separates the packaging material into multiple packages by a blade 58.

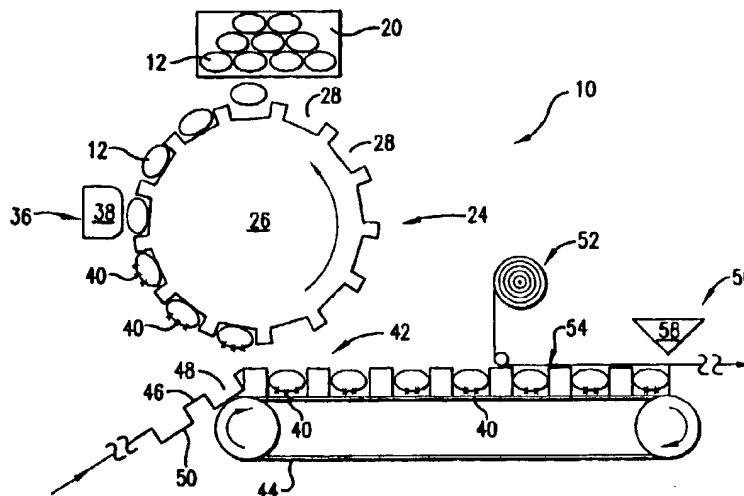


FIG.1

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Description

[0001] This invention relates to a method and apparatus for printing indicia on pharmaceutical pellet-shaped articles and placing them in a moving blistered receptacle. In particular, the invention relates to an apparatus using a transporting device to place a pellet-shaped article in a blistered receptacle such that the articles are uniformly oriented with respect to color and/or indicia as they appear through the clear portion of the blister. The present invention has special applicability towards two types of pellet shaped articles. First, substantially round tablets having first and second differently colored sides can be oriented within the blister package such that the same color is visible through the clear portion of the blister package. Typically, a predetermined (colored) side of the tablet will be selected to receive indicia, which will face the clear portion of the blister package. Second, substantially oblong capsules or caplets having differently colored ends can be oriented within the blister package such that ends having the same color will face the same direction.

[0002] The concept of providing solid medication in unit doses for oral consumption is well known and commercially available wherever pharmaceutical products are sold. Typically, the medication is packaged for distribution and sale in a blistered or bottled package. The present invention is primarily concerned with the blistered package and the orientation of a pellet-shaped article bearing printed indicia and/or dual colors so the orientation of the indicia and/or the dual colors remains visible to the consumer through the clear portion of the blistered recess.

[0003] The blistered package is known as a package composed of a thermoformed plastic film having a plurality of recesses or blisters arranged in a symmetrical pattern for receiving a dose of medication. The blistered package is typically covered by heat sealing a film of usually opaque material, such as aluminum foil, to the face of the package with the product contained in the blisters. Each capsule or tablet is then removed by placing pressure on the article through the respective blister causing the article to break through the sealed material.

[0004] To inform the user as to the type and strength of the medication, a package contains a trademark, logo and/or dosage indicator printed on the article prior to the article being placed in the recess or blister. Unfortunately, arbitrary placement of the articles in a blistered package often obscures the printed information, thereby requiring additional effort to determine the type of medication, and possibly exposing the user to mistakenly ingesting the wrong medication, which may lead to catastrophic or fatal results. In particular, tablets may be placed within the blister such that the indicia (printed on only one side) cannot be viewed through the blister. In the case of capsules or caplets, the differently colored ends may be oppositely oriented from one article to the next thus giving a disorganized appearance. In each

case, such packaging gives the impression that the medication placed in the blistered package was not subjected to quality control during manufacturing.

[0005] Numerous methods and machines have been developed to package such pharmaceutical products. Typically, the tablets or capsules initially have indicia printed upon them, then they are forwarded to be packaged, yet the capsules are not color organized and/or the tablets are not oriented for the user to read the indicia. One method to obviate the indicia orientation problem is to place indicia on two or more sides of the capsule or tablet so the printed indicia will be visible regardless of the article's orientation. However, this method results in increased costs due to the multiple apparatuses necessary to carry out the process, as well as the additional printing. This method may also have drawback that, although the indicia is visible on the tablets, the background base color of the tablets facing the clear portion of the blister package are different.

[0006] USP 3,933,239 discloses a capsule positioning machine. The machine includes a hopper supplying radially ordered capsules to transporting and inverting drums where the capsules are oriented to be positioned on a moving conveyor system. Although the capsules are positioned in the conveyor in a uniform manner, no printed indicia is placed on the capsules, thereby requiring the capsules to be printed at another station, or even worse, the capsules have no printing placed upon them leaving the user uninformed as to the contents of the capsules. In addition, the capsules are placed on a conveyor, indicating a necessity of having to be packaged at another station or machine thereby adding cost to packaging the pharmaceutical products. Also, Yoshida does not provide a mechanism for color based orientation of caplets having differently colored ends because caplets cannot be gravity oriented due to their uniform cross-sections and weight.

[0007] USP 5,415,321 discloses an apparatus for feeding a plurality of tablets simultaneously onto a matrix of blister packaging. The apparatus comprises a feeder having a rectangular housing including a product bin with a plurality of openings through which capsules fall when the feeder is vibrated. The capsules are placed in blistered packaging, however, the capsules are not marked with printed indicia, as well as being randomly positioned within the blistered packaging thereby making it unsure whether consumers will be able to read any information printed or indicated on the capsule, and know the nature or type of medication they are ingesting.

[0008] USP 3,545,164 discloses an apparatus and method for filling packaging receptacles. The apparatus has a top plate for supporting a number of randomly grouped capsules. The capsules are then agitated by a vibrator and separated from the supply. The capsules pass through guide mouths and are deposited in blistered packaging where the packages are closed and sealed once they are filled. Again, no device is provided

to mark the capsules with printed indicia and no tool is until to uniformly align the positioning of the capsules within the packaging.

[0009] USP 4,790,118 discloses a medication packaging and dispensing machine for packaging medication specific to a patient. The unit dose package includes the patient name, day, and hours of administration prescribed for the patient. However, the tablets or medication is not labeled, and thus the orientation of the capsule in the packaging system is of little importance.

[0010] USP 4,999,979 discloses a machine for continuously packing pharmaceutical products in plastic material containers. The machine comprises a station for receiving and unwinding reels of the plastic material, heating stations, a thermofforming station, a dosing station, a sealing station and a cutting station. There are also chains for moving the plastic material step by step from one end of the machine to the other as they pass through each station. However, the system does not have a station for printing indicia upon the pharmaceutical products. Also, the products are not oriented in a predetermined manner within the plastic container.

[0011] It is an aspect of the invention to provide a pharmaceutical product packaging apparatus capable of separating randomly grouped capsules or tablets.

[0012] It is another aspect of the invention to provide a pharmaceutical product packaging apparatus that marks the capsules or tablets with informative indicia while simultaneously maintaining the product's orientation.

[0013] It is yet another aspect of the invention to provide a pharmaceutical product packaging apparatus that places the capsules or tablets into a moving blistered package such that the uniform color orientation of dual-colored capsule/caplets and/or the indicia of the tablets are visible to the consumer through the clear portion of the blister.

[0014] In order to achieve the above, and to overcome the shortcomings in the prior art, a packaging apparatus according to the present invention includes a transporting device capable of placing capsules or tablets in blistered packaging with the uniform color orientation of dual-colored capsules and/or the printed indicia of the tablets visible through the clear portion of the packaging. Preferably, the transporting device can be a drum having a plurality of peripherally spaced cavities adapted to receive and maintain pellet shaped articles. Preferably, the drum is in rotary arrangement to the feeding, printing, and packaging stations. The cavities receive the articles from the feeding station and transport the articles to the printing station.

[0015] At the printing station, trademark or logo information and/or dosage strength are marked on a face of the articles. Preferably, the drum and the packaging station are synchronized so that the cavities of the drum and the blistered receptacles of the packaging station are aligned, so that when the drum delivers the printed articles to the packaging station, the articles are placed

in blistered receptacles such that the uniform color orientation of dual-colored capsules/caplets or the indicia of tablets is visible to the consumer through the clear portion of the blister.

[0016] The feeding station comprises, for example, a gravity feed hopper located above the transporting device. The hopper is designed to frictionally feed the randomly ordered articles into the cavities of the drum in a controlled manner.

[0017] The articles are then transported to the printing station where a printer marks indicia upon the articles. The printer can be an ink jet or contact printer.

[0018] In a preferred embodiment, the drum of the transporting device will contain a vacuum for maintaining the articles in their respective cavities. By drawing air into the cavities, the orientation of the articles will be maintained through the printing station. When the cavities with the printed indicia are aligned with the blistered receptacles, air drawn into the cavities is stopped, thereby forcing the articles to drop into the receptacles with the uniform color orientation or the indicia visible through the clear portion of the blister. It should also be noted that other devices, such as amp feed, maybe used to sport the articles through the various stations.

[0019] The packaging station has a conveyor system that continuously supplies packaging material. The packaging material comprises blistered receptacles having a clear portion capable of receiving and retaining a tablet or pellet. Because the conveyor and drum are operatively associated with each other, the blistered receptacles are aligned with the cavities. Therefore, once the articles pass the back guide they drop directly into the blistered receptacles with the uniform color orientation or the printed indicia facing through the clear portion.

[0020] Downstream on the conveyor system is a sealing station where a seal is applied to the blistered receptacles. A film of material, typically opaque, such as aluminum foil, is heat sealed to the receptacles, after which the packaged material is fed to a cutting station where it is separated by a blade in packages of four, six, eight, or such doses per packet for use by a consumer.

[0021] In an alternative embodiment, rather than vacuum, the drum may have an arcuate back guide provided having curvature substantially similar as the drum to maintain the orientation of the articles. The guide is adjustably positioned with respect to the drum to allow different sized articles to be transported.

[0022] The novel method accurately and automatically controls the movement of the articles from the feeding station, through the printing station and deposits them at the packaging station into the blistered package with the proper orientation.

[0023] The resulting apparatus and method for packaging printed pharmaceutical capsules or tablets places the articles with dual colors or printed indicia in blistered receptacles in a predetermined manner. In addition, the articles need only be printed on one side, saving time

and money. Also, the visibility of the indicia provides the consumer with the required information to help prevent improper administration of dosages. The need for less procedures to package the articles results in a more efficient apparatus wherein the manufacturing to process additional articles faster, resulting in a more economical apparatus that also provides a better informed consumer. Consequently, the present apparatus and method for packaging pellet-spaced pharmaceutical articles can be used so consumers can take doses of medication more easily, safely, and with less dangerous consequences.

[0024] The invention will be described in conjunction with the following drawings in which like reference numerals designate like elements and wherein:

Fig. 1 is a perspective view of the apparatus for printing indicia on a pellet-shaped pharmaceutical article and orienting the article within blistered packaging according to one embodiment of the present invention;

Fig. 2 is a perspective view of another preferred embodiment of the apparatus using a vacuum drum as the transporting device;

Fig. 3 is a perspective view of an alternative embodiment of the apparatus using a drum and back guide as the transporting device;

Fig. 4 is a multiple package of capsules showing tablet indicia through the clear portion of a blister package;

Fig. 5 is a flow chart diagram for the method of printing, orienting, and packaging a plurality of pellet-shaped pharmaceutical articles within blistered packaging material; and

Fig. 6 is a perspective view of additional feature of a drilling station for use with the apparatus of Figure 1.

[0025] While the invention will be described in conjunction with preferred embodiments thereof, it is evident that many alternatives, modifications and variations will be apparent to those skilled in the art. For example, the disclosure is intended to cover not only the various combinations of elements, but also the individual elements themselves. Accordingly, the preferred embodiments of the invention as set forth herein are intended to be illustrative, not limiting. Various changes may be made without departing from the spirit and scope of the invention.

[0026] Figure 1 is a perspective view of one example of an apparatus 10 for printing indicia on pellet shaped pharmaceutical articles 12 and orienting the articles 12 within blistered packaging according to a preferred embodiment of the present invention. Apparatus 10 includes a transporting device 24 that cooperates with a feeding station 20, printing station 36, and packaging station 42. The feeding station 20 is designed to distribute a plurality of randomly ordered pellet shaped phar-

maceutical articles 12 to the transporting device 24. The transporting device 24 is synchronized with the feeding station 20 and packaging station 42. Therefore, the transporting device 24 is able to continuously receive the articles 12 from the feeding station 20, guide the articles 12 through the printing station 36, deposit the articles in the packaging station 42, and repeat the cycle uninterrupted. Of course, the printing station 36 can be upstream of the transporting device 24, especially if the articles are preoriented such that a desired portion (e.g. end or side) of the articles will be visible in a proper orientation within the clear portion of the blister package.

[0027] Referring to Figure 1, the transporting device 24 is depicted as comprising a drum 26. However, the transporting device 24 is not restricted to this design and may be comprised of any number of transporting apparatus, such as a ramp-feed type device, for example. The drum 26 has cavities 28 adapted to receive the articles 12 from the feeding station 20. Once in their respective cavities 28, the articles 12 are taken to a printing station 36 having a printer 38 for marking the article 12 with printed indicia 40. The cavities 28 may be specially shaped to maintain the positioning of the articles 12 until forwarding the articles 12 to packaging station 42. The data is marked by a printer 38 such as an ink jet or contact printer, located tangentially to the transporting device 24 and between the feeding station 20 and packaging station 42 along the transporting path of the drum 26. The indicia 40 may provide information such as the manufacturer's trademark, a logo, and/or the dosage strength as well. From the printing station 36, the articles 12 are taken to the packaging station 42.

[0028] The packaging station 42 has a conveyor 44 for continuously supplying packaging material 46 defining blistered receptacles 48. Each blistered receptacle 48 has a clear portion 50 capable of receiving and retaining the articles 12. Since the drum 26 and the blistered receptacles 48 are aligned, the drum 26 is able to deposit the articles 12 into the blistered receptacles 48 with the article 12 oriented so the proper color and/or printed indicia 40 on the article 12 is visible (in proper orientation) through each clear portion 50.

[0029] Downstream of where the drum 26 deposits the articles 12 into the blistered receptacles 48, there may be a sealing station 52 where a seal 54 is applied to the open side of the packaging material 46. Ideally, the sealing material comprises opaque material. In addition, downstream of the sealing station 52 there may be a cutting station 56 where the filled packaging material 46 is separated by a blade 58. As shown in Fig. 4, the material 46 is separated into multiple packages 60 of articles 12 with the indicia 40 visible through the clear portion 50 of the blistered receptacles 48 and ready for sale or distribution.

[0030] Referring to Figures 2 and 3, an optional configuration of the feeding station is depicted. As is depicted in both figures, the feeding station 20 may pro-

vide a hopper 22 designed to contain and distribute the articles 12 to the transporting device 24. Although many alternatives exist, the articles 12, for example, will be gravity fed to the cavities 28 in the device 24 as the cavities 28 pass underneath the opening (not shown) of the hopper 22.

[0031] Figure 2 depicts an alternative embodiment of the present invention where a vacuum 34 is placed inside the drum 26. The drum in this case may include a shell 26A having pores that communicate the cavities and the vacuum. The shell 26A is guided about a non-porous stationary guide 27 such that the vacuum 34 is maintained along the path between the hopper and the conveyor 44. The vacuum helps the drum 26 maintain the orientation of the articles 12 within the cavities 28 along the path. The vacuum 34 maintains the orientation by drawing air into the cavities 28 through the pores, creating a negative air pressure, thereby keeping the articles 12 secured in the cavities 28. The negative air pressure is only applied along the section of the drum 26 between the feeding station 20 and the packaging station 42. The negative air pressure is cut off when the cavities 28 are aligned with the blistered receptacles 48 on the conveyor 44. Consequently, the articles 12 drop or are guided into the receptacles 48 with the indicia 40 being visible to the consumer through the clear portion 50 of the receptacles 48.

[0032] Figure 3 depicts an optional apparatus for maintaining the orientation of the articles 12 in the transporting device 24. After the articles 12 have passed through the printing station 36, a back guide 32 having a curvature similar to that of the drum 26 is provided. The back guide 32 prevents the articles from losing their orientation within the cavities 38 and from falling out of the drum 26. Once the printed articles 12 pass the back guide 32, the drum deposits the articles 12 into the blistered receptacles 48 so that the printed indicia 40 on the articles 12 is visible to the consumer through the clear portion 50. After depositing the article 12 into a corresponding receptacle 48, the vacated cavity 28 continues around to the feeding station 20 to pick up another article 12. It should also be noted that the position of the back guide 32 is adjustable in relation to the drum 26 so that articles 12 of different dimensions may be printed and packaged.

[0033] Turning to Figure 4, it can be seen that the printed indicia 40 on the articles 12 is visible through the clear portion 50 of the blistered receptacles 48. Each article is then removable by placing pressure onto the article 12 through the respective blister 48, causing the article to break through the seal 54.

[0034] Figure 5 explains the method in using the apparatus 10 for printing, orienting, and packaging the pellet shaped pharmaceutical articles within packaging material 46 with blistered receptacles 48. Step 1 of the method entails distributing the articles 12 onto a transporting device 24. Step 2 involves delivering the articles 12 on the transporting device 24 to a printing station 36

having a printer 38. Step 3 includes printing of indicia 40 onto the articles 12. Step 4 includes delivering the printed articles 12 to a packaging station. Step 5 entails depositing the printed articles 12 from the transporting device 24 onto a packaging station 42 having a conveyor 44 for continuously supplying packaging material 46 containing blistered receptacles 48, each having a clear portion 50 and capable of receiving and retaining an article, wherein the printed indicia 40 on the articles 12 is visible to the consumer through the clear portion 50.

[0035] Figure 5 also includes step 6, delivering the packaged articles 12 to a sealing station 52. Step 7 involves sealing the open side of the packaging material 46. Step 8 entails delivering the sealed packages to a cutting station 56. Step 9 requires separating the packaged material 46 with a blade 58 resulting in multiple packages of articles 60 ready for sale or distribution.

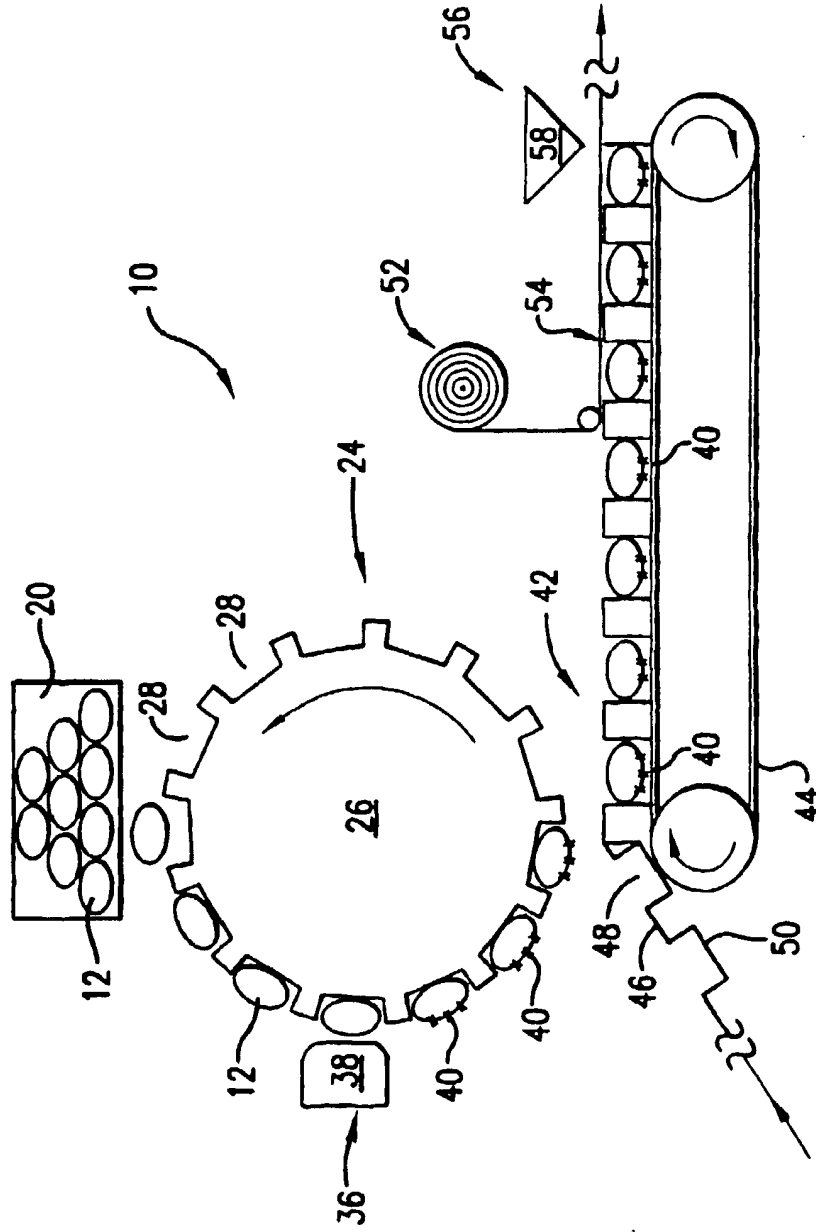
[0036] In other aspects of the invention, the articles 12 may be arranged in a predetermined order prior to being fed to the transporting device 24. See Figure 1A. The articles 12 may first pass through a drilling station 62 where a mechanical time-release mechanism 64 is created. The time-release mechanism 64 is formed by creating a depression or hole in the coating of the article 12 with a laser or other drilling device 66 so saliva and assorted body acids interact with the chemical composition within the article 12. This allows certain portions of the interior of the articles 12 to be immediately exposed to the stomach and absorbed into the bloodstream when ingested. From the drilling station 62, the articles 12 are transported to the feeding station 20 and/or the transporting device 24 as indicated by arrow 67.

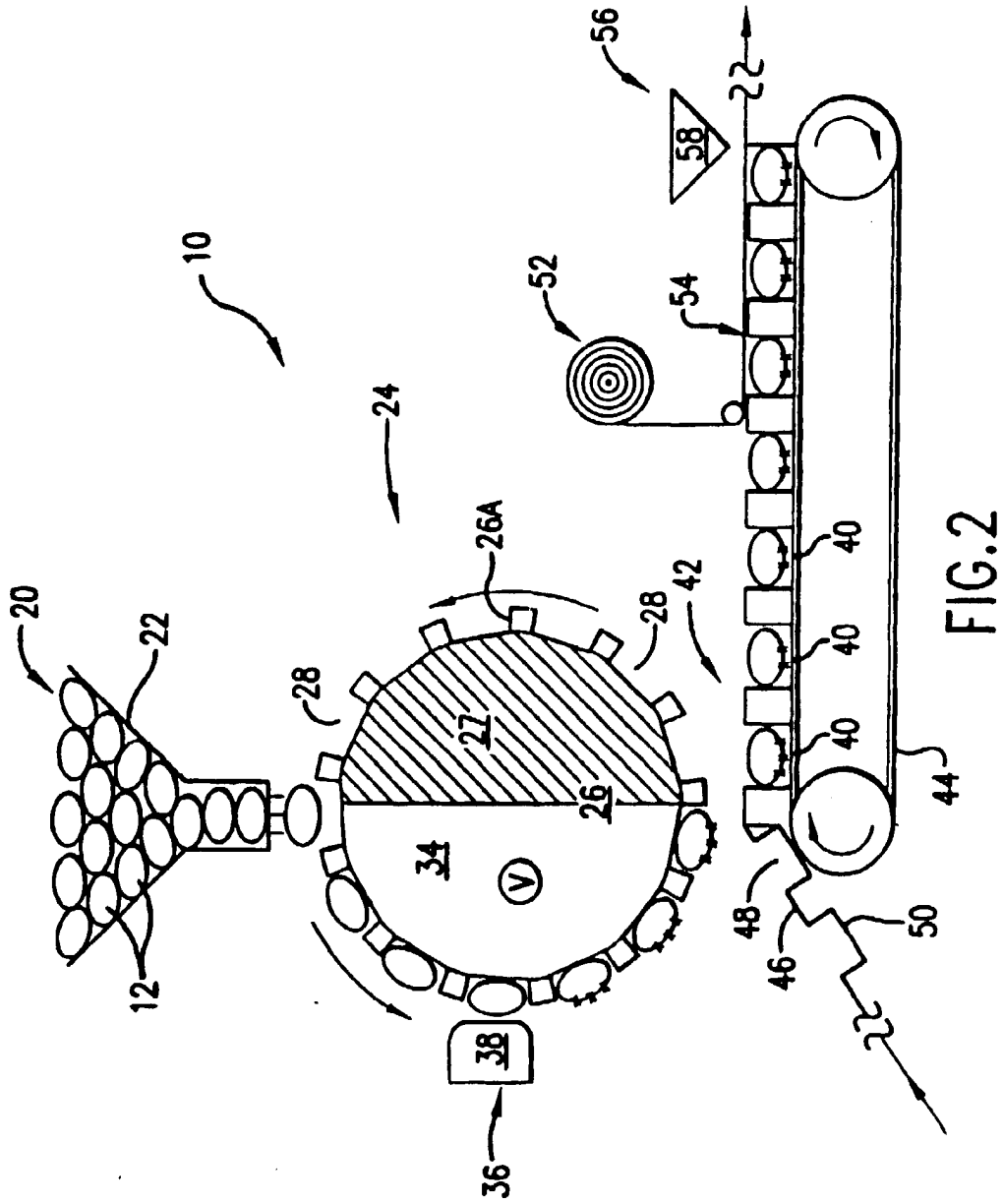
[0037] Optionally, it may be desirable to conceal the depression or hole using the printing station 36. Therefore, the drilling station 62 may be located between the feeding station 20 and the printing station 36. See Figure 3. The portion of the article 12 that will have the indicia 40 placed on it and exposed through the clear portion 50 of the blister receptacle 48 will also have the time-release mechanism 64, thereby resulting in the indicia 40 camouflaging the depression or hole. See Figure 3. Of course, the drilling station can be located downstream of the printing station 36 (Figure 2) depending on the desired appearance of the final product.

Claims

1. An apparatus (10) for orienting and packaging a plurality of pellet shaped pharmaceutical articles (12), such as capsules and caplets, within packaging material, the apparatus comprising:
 - a feeding station (20) configured to distribute a plurality of the articles;
 - a packaging station (42) such as a conveyor system for continuously supplying packaging

- material defining blistered receptacles (48), each of the blistered receptacles having a clear portion (50) and being capable of receiving and retaining at least one of the articles; and
 a transporting device (24) such as a drum (26) with a plurality of peripherally spaced cavities (28) adapted to receive the articles from the feeding station (20), the drum (26) and conveyor system being synchronized so that the blistered receptacles (48) and the cavities (28) are aligned, thereby allowing the drum (26) to deposit the articles into the blistered receptacles (48) so that a desired portion, such as a predetermined color, end or side of the capsules or caplets, is visible in a predetermined orientation through each clear portion (50).
2. The apparatus of claim 1, further comprising a printing station (36), such as an ink jet printer or a contact printer, that prints indicia on the articles downstream of the feeding station (20).
 3. The apparatus of claim 2, wherein the drum (24) contains a vacuum to draw the articles into the cavities by drawing air into the cavities so the articles in the cavities are maintained as the articles pass the printing station, the vacuum being effective until the articles reach the packaging station so that the articles are deposited with the desired orientation into the blistered receptacles.
 4. The apparatus of one of claims 1-3, further comprising a sealing station (52) downstream of the packaging station (42), wherein a seal is applied to an open side of the packaging material.
 5. The apparatus of claim 4, further comprising a cutting station (56) downstream of the sealing station (52), wherein the combined packaging material with the seal is separated by a blade.
 6. The apparatus of one of claims 1-5, wherein the drum (26) has an essentially arcuate and optionally adjustable guide (32) having a curvature substantially matching a curvature of the drum, the accurate guide being designed to maintain the orientation of the articles in the cavities between the printing station and the packaging station.
 7. The apparatus of one of claims 2-6, further comprising a drilling station (Fig. 6) optionally positioned near the printing station (36) to drill a hole into each of the articles.
 8. A method for printing, orienting, and packaging a plurality of pellet shaped pharmaceutical articles within packaging material, the method comprising:
 - distributing the articles on a transporting device (24);
 - printing indicia onto the articles (12);
 - delivering the printed articles to a packaging station (42); and
 - depositing the printed articles from the transporting device (24) on to the packaging station (42) that continuously supplies packaging material containing blistered receptacles (48), each of the blistered receptacles having a clear portion (50) and being capable of receiving and retaining one of the articles, wherein a desired portion of the articles is visible in a predetermined orientation through the clear portion (50) of the blistered receptacle.
 9. The method of claim 8 further comprising delivering the packaged articles to a sealing station (52) and a cutting station (56).
 10. The method of one of claims 8 and 9 wherein the step of printing occurs previous to the step of distributing the articles on the transporting device (24).





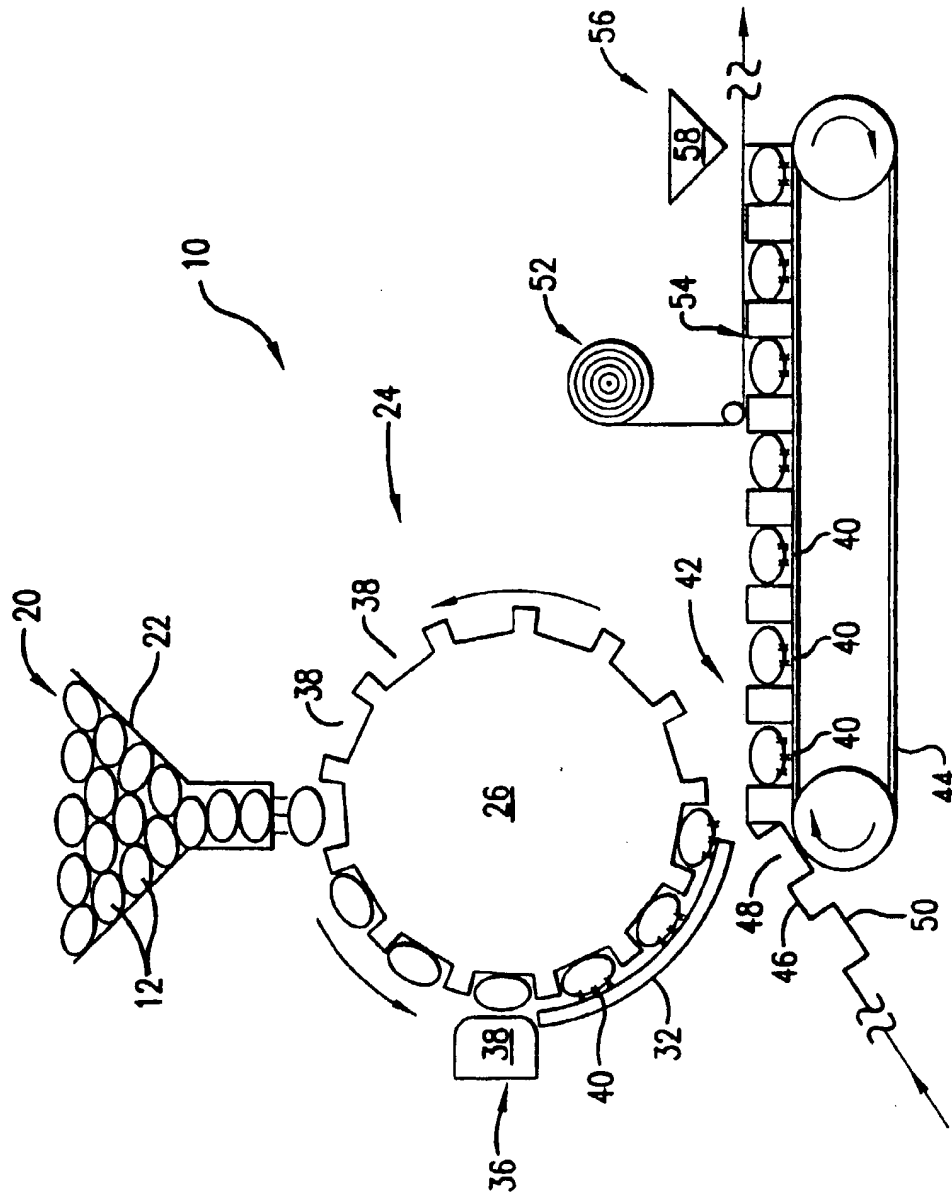


FIG.3

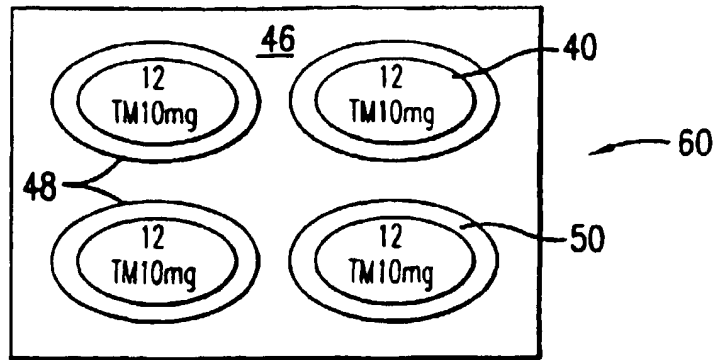


FIG. 4

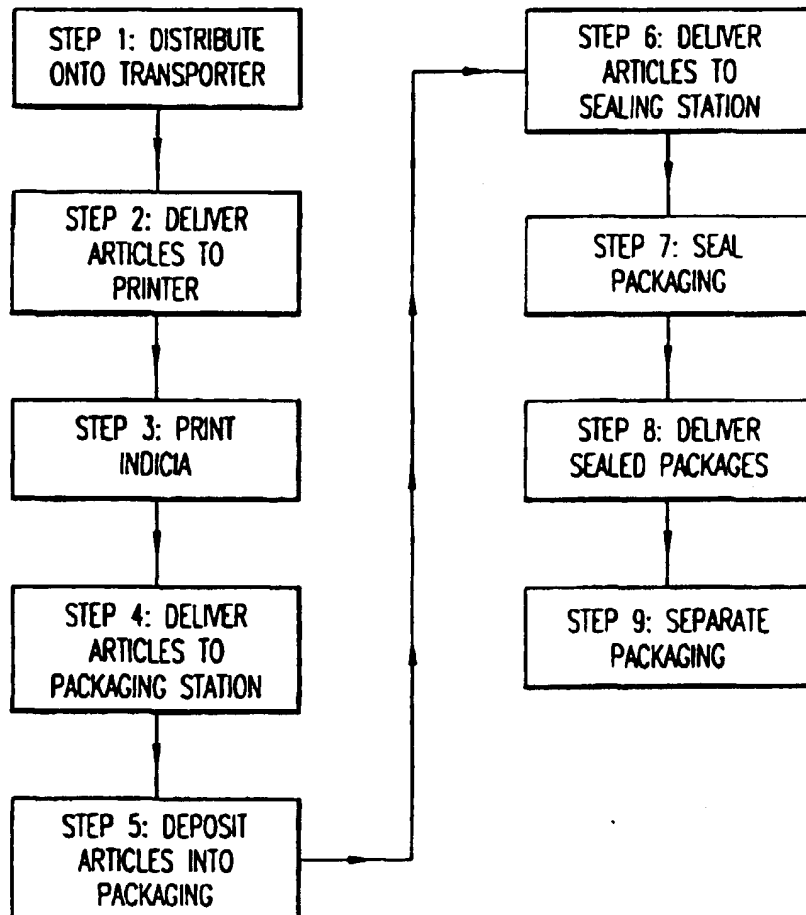


FIG. 5

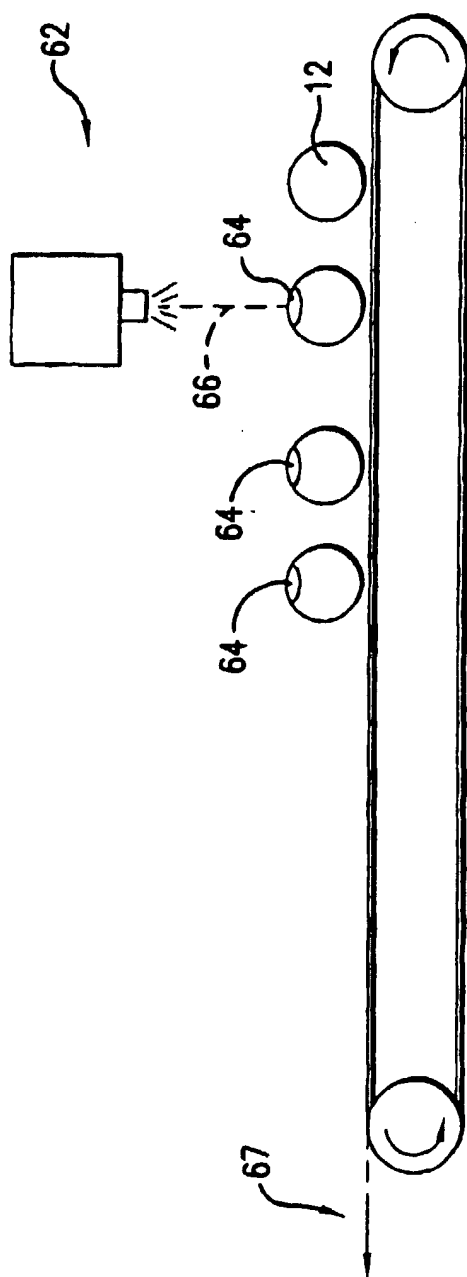


FIG. 6



European Patent
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EUROPEAN SEARCH REPORT

Application Number

EP 98 12 0926

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 6)
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Y	---	9	
X	WO 96 18539 A (I.M.A.) 20 June 1996 * page 12, line 19 - page 13; figure 1 *	1,3	
Y	WO 82 03842 A (E. ACKLEY) 11 November 1982 * page 29, paragraph 1-2; figure 1 *	2,3,8,10	
Y	DE 20 31 896 A (HASSIA VERPACKUNGSMASCHINEN) 5 January 1972 * page 2, paragraph 1; figure 1 *	4,5,9	TECHNICAL FIELDS SEARCHED (Int. Cl. 6) B65B B41F
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 3 February 1999	Examiner Grentzius, W
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 98 12 0926

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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03-02-1999

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